BIOL /ENVS / GEOG 3633.03 - Syllabus - Summer

Spatial Information and GIS in Ecology: A Practical Introduction

Instructor: Jennifer Strang (contact: jennifer.strang@dal.ca) with TBD

Time: 8:35 AM – 4:00 PM

Location: Elizabeth May Lab – 2012 Earth Sciences Wing, Life Sciences Centre

Days: June 11-17 - Dalhousie

June 18-22 - Harrison Lewis Centre, Field Station at Port Jolie

June 24-28 - Dalhousie

Prerequisites

BIOL2060 (Intro to Ecology)

Course Description

This class offers a hands-on introduction to many basic spatial topics including GIS, GPS and Cartography, and uses Geographic Information Systems (GIS) to teach most of these topics. It introduces students to GIS – What is it? What types of problems can it solve? Throughout the class, students are shown the basics of spatial data and some of the most commonly used tools in GIS.

Following one week in the classroom, students spend a week at field station where they have the opportunity to use the recently taught GIS skills to work on projects and solve problems. A number of projects will be offered for students to choose. The variety of projects will illustrate how GIS can be utilized as a tool for problem solving within a project rather than as the project itself. This course will show how GIS can be used as a tool in ecology. Students will be expected to bring together their newly acquired GIS skills with their own prior knowledge in ecology.

This class will introduce students to a wide variety of spatial topics, but with a limited depth. It is expected that students will gain enough knowledge and understanding to apply many basic GIS skills, as well as be comfortable with the general technology, layout and organization of data in GIS. The goal is for students to see how GIS can work for them, which may substantially different in the way another person may be using it. After taking this class, the student will have a basic foundation to be able to explore and understand more advanced topics through self study or additional course work.

Course Requirements

All students will require a memory stick (USB stick, jump drive) with 4 Gig of free space to be used for this course. **Students will require a PC that can load and run ArcGIS for the field portion of the class**. All material will be made available through BBLearn (New OWL). Additional readings will be available online. Students will also be required to supply a field book for notes.

Evaluation and Assessment

Participation	10%
(showing up for class/field on time and ready to work, answering questions during class, doing share of common chores when in field, treating colleagues with respect, etc.)	
Quiz – Theory (lecture material)	10%
Quiz – Hands on techniques	15%
Exercises	25%
Final Project	
Project Outline	5%
Project and Presentation	35%

** Late assignments will be docked at 5%/hr late

Schedule

Day 1 –

Morning

Course Expectations

Intro to GIS

- What is a GIS?
- Introduction to ArcGIS
    - ArcMap
        - Exercise – Trip Planning
    - ArcCatalog

Afternoon

GIS Data

- How is it collected?
- Show examples for NS
- Show examples for World

Introduction to Basic Map Making

- Titles
- Scale bar
- Legend
- North Arrow

- Adjusting Colour
- Gradicules
- Credits

Introduction to Projects Options

Day 2

Morning

File Management

- ArcGIS Formats
    - Types of Geodatabases
        - What can go into a Geodatabase
    - Comparing Shapefiles and Geodatabases
- What is the difference between GIS Data and a GIS Project
    - Sharing GIS Data and Projects
- Understanding the difference between GIS data (shapefiles/geodatabases) and Layers
- How to create a geodatabase

Projections and Datums

- Define Projection
    - Types of projections
    - Distortions
    - Picking a projection
- Defining Datums
    - Horizontal Datums
        - Commonly used datums in NS
        - What happens if you use an incorrect datum
        - Clues that datums is different
    - Vertical Datums
        - What are they
        - Why do they matter

Afternoon

Commonly used Vector tools

- Clip
- Buffer
- Attribute Selection

- Select by Location

Day 3

Morning

GPS

- How a GPS works
- Hands on project (geocaching)
    - Defining projection/datum
    - Saving points and lines
- Adding GPS data into a GIS

Afternoon

Creating data

- How to add points, lines, and polygons by tracing in from a georeferenced image
- How to add points, lines, and polygons using coordinates
- How to add points from a table
- Setting snapping

Editing data

- How to change the attributes of a feature
- How to change the shape/location of a feature
- Adding fields
- Calculating Area of polygons

Day 4

Morning

Introduce more Vector Tools

- Erase
- Dissolve

- Merge
- Union
- Intersect
- Create Random Points

Review

Afternoon

GIS Data Models

- Comparison between Vector Model and Raster Model
    - Define the 2 models
    - Tips on when to use which
    - Advantages/Disadvantages to each
    - How to identify which model is being used

Day 5

Quiz – Theory

Morning

Introducing Raster Data

- Show examples of Raster data (satellite, airphoto, scanned image)
- Querying the raster data

Commonly Used Tools for Raster

- Reclassification
- Surface
    - Hillshade
    - Slope
    - Aspect
- Neighbourhoods – Local, Focal
- Raster Calculator

Afternoon

More commonly used Tools for Raster

- Clipping a raster
    - By attribute
    - By shape
    - By layer
- Creating a DEM
- Converting to Polygon

Georeferencing

Days 6

Meet at Dal at 9:00 AM on Tuesday; drive to Harrison Lewis Centre, Sandy Bay Landings, Port Joli area
See list of personal items below that you need to bring.
Work on data collection/verification during the day, evening spent working on Major project
Return to Dal by 5:00 PM on Saturday.

Day 11

Quiz – Hands-on

Morning

Cartography

- Color
    - Ways of representing color
    - Tips for color choices
- Typography
    - What are the 2 main font families
    - Tips on choosing fonts
- Basics
    - Aligning features
    - Other misc.

Afternoon

Other Topics…

- Metadata
    - Why it is important
    - How to add it
- Hyerlinking
- Other useful software

Work on Projects

Days 12-13

Work on Final Project

(Will be expected to be in class)

Day 14

Present Final Projects

Day 15

Pass in Final Project

Personal items you need to bring on the field trip

- snacks & special treats for yourself
- field notebook
- class handouts and notes
- clipboard & notebook paper
- pens & pencils (the latter for the rain)
- plastic bags to keep things dry
- re-usable water bottle
- sleeping bag
- flashlight & extra batteries
- small daypack to carry your things
- bug head net or jacket (optional)
- rubber boots
- hiking boots
- sneakers or sandals
- slippers to wear in the cookhouse
- wind jacket
- raingear (jacket & pants)
- long pants, long-sleeved shirts
- T-shirts, shorts
- ball cap or hat with a sun brim
- sunglasses
- warm hat & gloves
- sweater, sweatshirt or fleece jacket
- hair ties for long hair

- underwear, socks
- long underwear for cool nights
- swimsuit (optional)
- sunscreen, insect repellent
- personal toiletries, toothbrush & toothpaste, soap, shampoo, towel
- prescription drugs you need to take
- allergy medication (e.g. Benadryl)
- aspirin /Tylenol/ibuprofen
- cash, if you need to buy anything
- novel or other reading (optional)
- PC laptop for GIS work
- other laptop (optional; wireless satellite internet available)
- field guides (optional)
- binoculars (optional)
- camera (optional)